

## Yield Modeling Tools for direct imaging of exoplanets

AAS242 splinter session (hybrid)

<https://jpl.webex.com/jpl/j.php?MTID=m68155519d9be2bf47ce100e9937d97c8>

June 8, 2023; 9am – 11am, 12:30-3:00pm

Chairs: Rhonda Morgan, Dmitry Savransky

### Description:

NASA has responded to the recommendations of the astrophysics decadal survey by establishing the Great Observatories Maturation Program (GOMAP), which will reduce risk for the Habitable Worlds Observatory and lay the groundwork for future great observatories. A key element of this maturation will be the evaluation of the impact of design options on science outcomes – and specifically, science yield modeling. This workshop will bring together the vibrant communities of mission and instrument designers and yield modelers to share expertise, demonstrate yield modeling tools available today, and establish priorities for future model improvement and model-driven assessments. The workshop will include resources for anyone wishing to learn more about various elements of yield modeling, and will include live working sessions where participants are able to try out the current generation of modeling codes and learn how these can contribute to their own work.

### Agenda Pre-Session:

Pre-recorded short talks (5-10 minutes each) on the fundamental concepts of yield modeling tools will be available to participants a couple weeks before the session:

- Star Catalogs (Erik Mamajek)
- Occurrence rates and planet demographics (Jesse Christiansen)
- Orbits: Planet generation, planet propagation, orbit geometry (Eric Nielsen)
- Completeness: IWA, OWA, integration time, delta magnitude, noise floor, phase function (Dmitry Savransky)
- Solar and Exozodiacal light (Bertrand Mennesson)
- Photometry and instrument modeling including spatial and temporal noise and post-processing (Bijan Nimati)
- Photon Counting (Bijan Nimati)
- Starlight suppression system Standard Inputs (John Krist)

### Agenda Session 1:

0. Rhonda Morgan (10 mins): introduction and importance of yield tools for science requirements and mission requirements

1. Dmitry Savransky (30 mins): detailed overview of EXOSIMS open source mission simulation tool

2. Chris Stark (30 mins): detailed overview of AYO (Altruistic Yield Optimization)
3. Felix A. Dannert (10 mins): "Yield prediction for space-based nulling interferometry"
4. Samantha Hasler (10 mins): "Reducing Detection Confusion in Directly Imaged Multi-Planet Systems"
5. Margaret Bruna, (10 mins): "Orbit Retrieval of Directly Imaged Exoplanets: When and How to Look"
6. SIG2 (5 mins): Current progress in demographics
4. Rhonda Morgan facilitates (15 mins): Q&A and discussion of priorities for future model improvement

**Agenda Session 2:**

1. (60 mins) Interactive tutorial of EXOSIMS using GoogleCollab and at least two sample problems
2. (40 mins) Interactive tutorial of ExoVista
3. (50 mins) Open hack time for participants to start on their own problems with assistance from tool developers